Cinta Senese and Large White x Cinta Senese raised on pasture in wood: sample join composition and meat quality

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RIASSUNTO – Suini Cinta Senese e Large White x Cinta Senese allevati al pascolo in bosco: qualità della carne – *In due recinti, di 14 ha ciascuno, sono stati allevati 55 suini: 14 (7 CS e 7 LWxCS) in uno (Bassa densità) e 41 (20 CS e 21 LWxCS) nell'altro (Alta densità). Ciascun gruppo era bilanciato per sesso. I maschi sono stati castrati. Ad un'età media di 336 giorni i soggetti sono stati macellati. I suini di razza pura, relativamente alla composizione del taglio campione, hanno fatto registrare le più basse percentuali di magro e la più alta incidenza di osso. I CS puri hanno fornito inoltre carne più rossa, più intensamente colorata e con la più alta percentuale di grasso intramuscolare. La diversa densità di allevamento non ha esercitato effetti significativi ad eccezione del maggior peso del taglio campione registrato per il gruppo "bassa densità".*

KEY WORDS: Cinta Senese, crossbreed, outdoor, meat quality.

INTRODUCTION – During recent years animal welfare has received considerable attention in Europe. To satisfy the demand for better ethics and health regarding pigs, it has become popular to raise pigs outdoors. In Mediterranean area free-ranged system is carried out with indigenous breed. In Italy Cinta Senese is one of the main autochthonous breed. In past times Cinta Senese sows were frequently crossed with Large White boars in order to obtain the so called "grigio", which could be proposed, nowadays, as industrial crossing. Aim of this work is to study the effects of genetic type and rearing density on sample join composition and meat quality traits.

MATHERIALS AND METHODS – In two fenced areas, each one of 14 ha, two groups of animals were reared. One group of 14 pigs (Low density) was so defined: 7 Cinta Senese (CS) and 7 Large White x Cinta Senese (LWxCS). The other group of 41 pigs (High density) was formed by 20 CS and 21 LWxCS. Each group was balanced for sex. Males were castrated. For more details of the experimental design see Campodoni *et al.* (2003). Animals were slaughtered at 336 (S.D. ± 14 d) days of age, on average. At 45 minutes *post-mortem*, pH on *Longissimus lomborum* (pH_{45}) was measured. From loin a portion from 2nd to 5th lumbar vertebra inclusive, was removed. Sample join so obtained was defatted removing the residual subcutaneous fat. This depot was not representative of sample join adiposity because of differences among operators at side dissection. Sample join was dissected into lean, intermuscular fat and bone. On *Longissimus lomborum* (LL) the following analysis were carried out: pH; colour measurements (L*, a*, b*, Chroma and Hue) using a Minolta Chromameter; water-holding capacity (WHC) by drip loss and cooking loss in water-bath; shear force measurements (WB) on raw and cooked meat; moisture by lyophilising; intramuscular fat (IMF) by ether extraction; protein by Kjeldahl method; ash. Statistical analysis was carried out by GLM procedure of S.A.S (1988) including the fixed effects: day of slaughter (2 levels), genotype, rearing density and sex. Interactions among factors were no significant.

RESULTS AND CONCLUSIONS – Table 1 reports the results on the sample join dissection. CS pigs showed the lowest weight of sample join, also because of their lowest weight at slaughter. For tis-

sular composition CS pigs were less lean than LWxCS and they showed the highest percentage of bone. No differences between the genotypes were found for intermuscular fat but, because of removal of subcutaneous fat, there is no evidence that the two genetic types had the same level of the total fatness. As reported by Franci *et al.* (2001a), there is no accord in literature about the relationship among the various fat depots; however it is clear that it's strictly connected to genetic and environmental factors. Moreover in previous work on carcass characteristics (Campodoni *et al.*, 2003) the same Cinta Senese pigs showed the highest adiposity. In Table 2 pH value and physical traits are reported. No differences between genotypes were found for pH values, water holding capacity and shear force. Cinta Senese pigs had LL with the lowest values of L* and Hue and the highest value of Chroma. The last two results were due to the highest value of a* in Cinta Senese pigs while no differences were found for the coordinate b*. Meat from Cinta Senese pigs appeared more red and more intensively coloured. No differences between genotypes were found for moisture and protein percentage, while Cinta Senese showed the highest values of intramuscular fat and ash contents (Table 3). This results are partly in accord with previous work on comparison between pure Cinta Senese and its cross with Large White (Franci *et al.*, 2001b), which was, however, carried out with animals reared in intensive conditions and slaughtered at the same weight but at different age.

Table 1. Sample join composition.

	Genetic type		Density		Sex		rsd
	CS	LWxCS	High	Low	Barrow	Female	
slaughter weight kg	125a	159b	139	144	145	139	11.1
sample weight g	1280a	1899b	1499b	1680a	1502a	1677b	267
- lean %	75.7b	79.3a	77.3	77.7	76.5a	78.5b	3.01
- intermusc. fat %	3.2	2.8	3.1	2.8	3.05	2.9	1.59
- bone %	20.4b	17.6a	19	19	19.8a	18.3b	2.6

Means with different letters differ at the 5% level.

Table 2. pH and physical traits of LL muscle.

	Genetic type		Density		Sex		rsd
	CS	LWxCS	High	Low	Barrow	Female	
pH_{45}	6.50	6.49	6.46	6.53	6.53	6.47	0.19
pH_{24}	5.63	5.57	5.57	5.64	5.62	5.59	0.13
drip loss %	2.73	2.78	2.74	2.77	2.66	2.85	1.48
cooking loss %	29.7	28.1	29.7	28.1	29.3	28.5	4.19
WB raw meat kg	9.2	9.5	9.28	9.51	9.58	9.21	1.94
WB cooked meat kg	11.8	11.7	12.1	11.4	11.4	12.1	2.77
L*	47.75b	50.37a	49.1	49.02	48.8	49.3	2.34
a*	12.66a	10.95b	11.73	11.88	12.13	11.48	1.31
b*	4.00	4.26	4.15	4.11	4.12	4.13	0.73
chroma	13.3b	11.77a	12.6	12.5	12.85	12.22	1.34
hue	0.307b	0.371a	0.336	0.341	0.330	0.348	0.055

Means with different letters differ at the 5% level.

Table 3. Chemical composition (on wet basis) of LL muscle.

	Genetic type		Density		Sex		rsd
	CS	LWxCS	High	Low	Barrow	Female	
Moisture %	73.67	73.73	73.82	73.58	73.62	73.68	0.61
Protein %	22.34	22.56	22.4	22.5	22.4	22.5	0.67
IMF %	2.50a	2.09b	2.24	2.35	2.48a	2.1b	0.6
Ash %	1.14a	1.18b	1.16	1.16	1.15	1.17	0.07

Means with different letters differ at the 5% level.

As the effect of rearing density is concerned, no differences were found between the two experimental groups except for the highest weight of sample join recorded in the low density pigs. As regard differences between sex, castrated males showed the lowest values of sample weight and lean percentage and the highest intramuscular fat content.

In conclusion, these results suggest that, in free range system, the use of crossing between Cinta Senese and Large White can supply products not very different, as regard meat quality traits, from those obtained from pure Cinta Senese breed.

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REFERENCES – **Campodoni**, G., Badii, M., Sirtori, F., 2003. Proc. 15th Nat. Cong. of ASPA, Parma 18-20 June. **Franci**, O., Pugliese, C., Bozzi, R., Acciaioli, A., Parisi, G., 2001a. Meat Sci. 58:259-266. **Franci**, O., Gandini, G., Madonia, G., Pugliese, C., Chiofalo, V., Bozzi, R., Acciaioli, A., Campodoni, G., Pizzi, F., 2001b. Pig genetic resource in Europe. EAAP publication n°104:67-76. **SAS/STAT**, 1988. "User Guide, Release 6.03", Edition. Cary, NC:SAS Institute Inc.